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ASSOCIATIONS BETWEEN MORTALITY AND VARIOUS SOCIAL, ECONOMIC AND ENVIRONMENTAL FACTORS IN NORTH CAROLINA (An Indirect Study)

For nearly two decades, the question of a relationship between health and the mineral content of water has been cause for epidemiologic studies both in the United States and abroad. Although these studies have failed to produce conclusive evidence as to the identity of any underlying "water factor," there is a general impression that one or more such entities exist and that cardiovascular disease is a particularly apt effect. To date, the hypothesis most often formulated has been that of a negative association between cardiovascular disease and water hardness. (1)

In an attempt to elucidate the water story in North Carolina, Brittain (2) has studied water hardness while Voors (3) has assessed calcium and potassium in drinking water as possible determinants of heart disease mortality. Findings for hardness were not in the expected direction, but Voors found—for inner plain and eastern Piedmont counties—that water calcium correlated negatively and water potassium positively with "sudden" atherosclerotic heart disease mortality among white males.

There is also mounting evidence that higher elevation favors improved heart function (4,5). With its physical gradients ranging in elevation from sea level to peaks of more than 6,000 feet, North Carolina seems most suitable to investigations of the altitude question.

The present study is a further attempt to elucidate North Carolina's water story while examining elevation and other possible correlates of cause-specific mortality. For eighty-one of the State's 100 counties, multiple linear regression is used to determine what factors, including 15 water constituents and 17 other environmental and socio-economic indicators, might be affecting selected age-race-sex-adjusted death rates. In these analyses, occupational distribution is used to control for occupation-related factors not otherwise accounted for in regression.

METHODS AND MATERIALS

Mortality Data

Rates used in these analyses are the 1973-75 average annual death rates, adjusted for age, race and sex (6) and specific for the four disease entities described on the next page. Other causes of death were not studied due to the fact that death rates are presently computed only for underlying causes of death, and for many diseases, the "incidence at death" is known to be much higher. For example, hypertension, arteriosclerosis and diabetes are considered "associated" conditions far more often than they are considered an underlying cause. Since our primary interest is in the determinants of disease rather than the determinants of underlying causes of death per se, analysis based solely on underlying frequencies would not be appropriate. We also did not study causes for which 3-year rates appear to fluctuate randomly over time.

The following underlying causes were deemed amenable to study on the basis that (i) the underlying frequencies are thought to closely represent the incidence at death and (ii) correlations between the 1968-70 and 1973-75 county death rates (100 counties) are statistically significant suggesting the existence of some local condition that may invite intervention.